SIEMENS

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SP

Endoscopy Option

Troubleshooting Guide

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Notes

- The original of this document was written in German.

Safety Information

Adhere to all general safety information for medical devices when performing any activities or tests specified in this manual.

Product-Specific Information

Required Documents

- Operating instructions for the TFT Monitor
- Operating instructions for the camera, light source

Required Tools and Measurement Devices

- Standard tool kit
- 100 Mhz oscilloscope (e.g.,Tektronix 2335), also refer to ARTD 3.
- Mavo Monitor, also refer to ARTD 3.

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Endoscopy Camera

- Hospital personnel are generally responsible for connecting the endoscopy video camera, a third-party product, to the endoscopy interface.
- Hospital personnel are responsible for connecting the communication cable from the camera to the light source, e.g., a video cable or special connection cable, according to the camera's operating instructions.
- Authorized customer service personnel from the camera manufacturer are responsible for adjusting the endoscopy camera.
- Use camera heads/endoscopes from the same manufacturer, as well as a suitable camera intensifier.
- The image displayed at the reference monitor and the image quality depend on the signal strength at the camera output. The signal is then sent to the video input of the TFT monitor. The video input of the TFT monitor is set at the factory to a standard video signal of 1 Volt Peak/Peak (700 mV image signal; 300 mV synchronizing signal).
- Losses in quality may occur because endoscopy video cameras of various manufacturers are used. These cameras may provide a higher or lower video signal than indicated by the standard. The video signal standard has been set at 1 Volt Peak/Peak (700 mV image signal; 300 mV synchronizing signal).
- Endoscopes of various sizes may be used with different lenses and fields of view, depending on the examination. Accordingly, the round field of view on the monitor may be somewhat smaller or larger.

Endoscopy Interface

- A set of cables is connected to Y and C at the front of the endoscopy interface to transmit video signals from the camera. Both inputs (S-Video, Video) provide the same functions. The S-Video input is recommended because it provides better signal quality. If a signal is sent to both inputs simultaneously, the S-Video signal passes through and is displayed at the monitor.
- The built-in interface contains a 230 V supply voltage, which is connected at the back of the device.
- Line voltage for the endoscope is provided via a cable with separate fuse protection, preferably 230 Volts / 16 amps.
- All endoscopes need to be connected to the grounding bolts of the endoscope holder (equipotential bonding).
- If used, the RF measurement device should be connected to a grounding bolt on the endoscope holder.

Endoscopy Monitor (TFT)

- The reference monitor may be used in X-Ray, Ultrasound, and Endoscopy modes. The mode is selected using the control panel or system footswitch.
- In "X-ray mode", images are transmitted from the image system container via the RGB inputs at the monitor.
- In "Endo mode", images from the endoscopy camera intensifier are transmitted via the endoscopy interface at the S-video input.
- In "Ultra" mode, images are transferred from the ultrasound device via the ultrasound interface at the FBAS input.
- Brightness/contrast/background light for the reference monitor are set once at the factory for all modes.
- Color is set at the factory for 4 basic settings, which can be selected in the Brightness/ Contrast menu. Settings 1, 2, and 3 are fixed values; the user may set the colors desired under the "user" setting.
  - 1: used primarily for X-ray reference, the image is somewhat light and blue.
  - 2: used both for X-ray and endoscopy, the image is neutral.
  - 3:used primarily for endoscopy, the image is somewhat red/brown.
  - User: colors may be set individually per customer requirements.
- Basic luminance settings for the TFT monitor are made at the factory.

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NOTICE

When brightness and contrast are low, check luminance using a test image and the Mavo Monitor, and adjust to the specified luminance when necessary.

Use the most recent adjustment instructions for the monitor.

Replacement of the monitor is recommended if the maximum luminance is less than 100 cd/m².

TFT Monitor is Dark

- **After switching on the system, the reference monitor remains dark. When switching from Endo/Ultra/X-Ray, the monitor displays an image or the message "No signal".**

Possible causes:

- Video connection between the image system container and the monitor disconnected. Output PC board D233 Ref in the image system container is defective.

Action:

- Check the video connections, measure the video signal, replace the video connection cables/OUT at PC board D233 Ref with D233 Live for test purposes.

TFT Monitor Remains in X-ray Mode

- **When switching from Endo/Ultra/X-Ray, LEDs on the interface do not flash and the monitor remains in X-Ray mode.**

Possible causes:

- 230V supply voltage not connected to the interface.

Action:

- Check the plug connections, check the supply voltage.

TFT Monitor Switches Back to X-ray Mode

- **Endo image is not displayed at the TFT monitor. The message "no signal" is displayed at the monitor and it switches back to X-ray mode.**

Possible causes:

- The output signal from the camera intensifier is not at the Y input of the interface.

Action:

- Check the video connection between the camera intensifier and the interface, measure the video signal.

Colors Displayed Incorrectly at TFT Monitor

- **In X-Ray mode, the reference image at the TFT monitor is displayed in color (may also occur with TFT live).**

Possible causes:

- RGB signal strength is unequal or a signal is missing.

Action:

- Check the video connection from image system container D233 to the TFT Monitor, measure the video signal, replace the video connection cables/OUT at PC board D233 Ref with D233 Live for test purposes.

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Smearing

Smearing, similar to a small shadow, occurs when moving the endoscope. This effect is common with PCs and laptops, where the mouse pointer is always followed by a small shadow (the smearing effect for the mouse may be stronger on a PC).

Delay

When moving the endoscope, there is a (minimal) delay between the manual movements and what is displayed on the monitor. This is similar to the delays experienced during live transmissions via satellite.

Tearing

Losses in image information at the sides of the monitor are visible when moving the endoscope. This missing information appears similar to torn-out black and white triangles of various sizes.

Skipping

When moving the endoscope in transverse direction (side-to-side) in a large hollow body such as the bladder, the image appears to briefly freeze and then reconstruct. This effect is common in discos when strobe lights are switched on; people's movements appear disjointed.

Blooming

Blooming occurs with light image content, and appears as an image that is too bright or as glare on the image. It is also known as the saturation effect, where image content can no longer be displayed. The signal strength (voltage) exceeds the monitor's specified operating range.

Image Sector Size

The size and position of the endoscopy image may be incorrect because of the endoscope used. This is similar to obtaining images of incorrect size or position when using a reflex camera with lenses from a third-party manufacturer.

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NOTICE	**If in doubt, connect a CRT video monitor (PAL/NTSC) parallel to the endoscope in order to clearly determine whether the cause of the error is the endoscope or the monitor.**

Smearing

Object smearing during movement is a characteristic of digital cameras and monitors caused by the pixel refresh rate. The characteristic varies depending on the camera manufacturer and type. In addition, this characteristic may be caused (to a lesser extent) by the TFT manufacturer and type.

- The problem cannot be corrected by adjusting the monitor.

Delay

Similar to smearing, delays in the display movement are caused by additional image scanning. There is a slight delay between the movement in front of the camera and the visible change at the TFT monitor.

- The problem cannot be corrected by adjusting the monitor.

Tearing

Tearing is caused by incorrect synchronization. Measure the video signal at the endoscopy interface input. The synchronizing signal has to be 300mVolt and the maximum image signal 700mVolt. The dynamic changes in video signal voltage can be evaluated on the oscilloscope during movements or significant light changes in front of the camera optics. The image signal may not exceed 700 mVolt. If this value is exceeded, the entire video signal is greater than 1 Volt Peak/Peak, which may result in synchronization failure.

- Correct the error by adjusting the camera to a video signal of 1 Volt Peak/Peak, specifically by limiting the video signal. If the camera cannot be set, use a camera with a standard output signal of 1 Volt Peak/Peak (authorized customer service personnel from the camera manufacturer are responsible for adjusting the endoscopy camera).
- The video signal can be reduced by approx. 30% (only in exceptional cases) by connecting a terminal resistor (75 Ohm termination) to the video output at the back of the endoscopy interface. The front of the interface has to be removed to connect the resistor.
  - A T plug is connected to the video output of the endoscope. One connector is attached to one side of the video cable for the monitor, and the other is connected to a 75 Ohm termination, which reduces the video signal at the endoscopy interface output.

- Check the videosignal with an oscilloscope.
- Check the entire image. If necessary adjust according ""Checking/Setting the TFT Monitor", see page 5-4.

Skipping

Skipping may occur during fast horizontal movement. It only occurs during a few medical applications.

- The problem cannot be corrected by adjusting the monitor.

Blooming

Blooming can have different causes.

Do not disconnect the plug when testing the video signal at the endoscopy interface input, otherwise the 75 Ohm termination will fail.

Example of video signal at the oscilloscope with a pair of chrome-plated pliers.

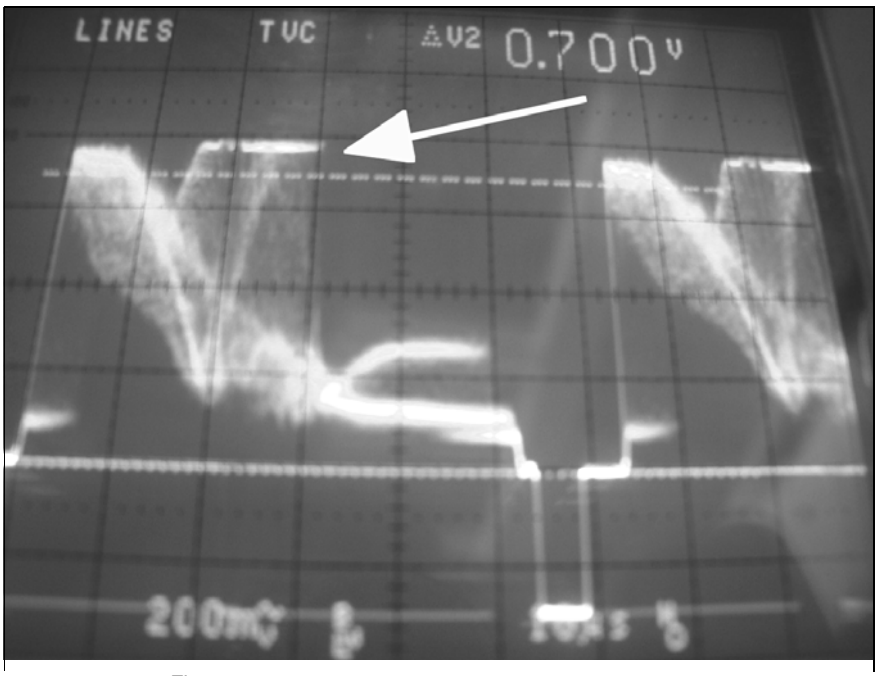

Fig. 1

The video signal truncates / reaches saturation at 700 mVolt; refer to the arrow in Fig. 1.

1. Camera:

Intensifying the camera signal may result in truncation (limitation) of the image signal when there are significant signal changes.

- Reduce camera amplification.

2. Camera light source:

Depending on manufacturer and type, the light controller reacts slowly or not at all.

- Reduce the light intensity.
- The connection cable from the light source controller to the camera amplification is missing or defective.
- The light regulator is defective.

3. Monitor:

If the brightness or contrast are set incorrectly, the image will appear to too bright or flat, or black regions will appear gray.

Note when switching on the OSD (Operating Screen Display) for TFT Monitors:

18" Monitor

To block or unblock the OSD menu, quickly press (within 1 sec.) the following key combinations:

- Press the "Set" key once
- Press the "Up" key three times

Checking / Setting the TFT Monitor

The bright, glaring image areas on the monitor that significantly impair image quality during the examination are caused by reflective (bright) work utensils (e.g., scissors).

Acquire an image using the camera with endoscopy optics to evaluate bright image areas on the monitor. Position a pair of pliers on an OR sheet (green or blue) to establish the settings.

Evaluate the differences in brightness from the OR sheet and reflective parts using the monitor image.

Adjust the video input of the TFT monitor to the video level from the endoscopy camera:
- Use the contrast control for the bright (white) region
- Use the brightness control for the dark (black) region

The bright, glaring image areas may be slowly darkened by reducing the contrast until image noise (transition from glaring white to regular white) is detected.

The settings may be made as shown in the following sample images.

Use chrome-plated pliers or a chrome-plated Allen wrench for the test configuration.

- Select "image source" and "S-Video".
- Proceed as follows:
  - Acquire 3 images for the test configuration using chrome-plated pliers.
  - Acquire 3 images for the test configuration using a chrome-plated Allen wrench.

The test images each show 3 settings at the TFT monitor:

- **1. Image with too little contrast.**
- **2. Image with correct contrast.**
- **3. Image with too much contrast**

Example of the test configuration with chrome-plated pliers

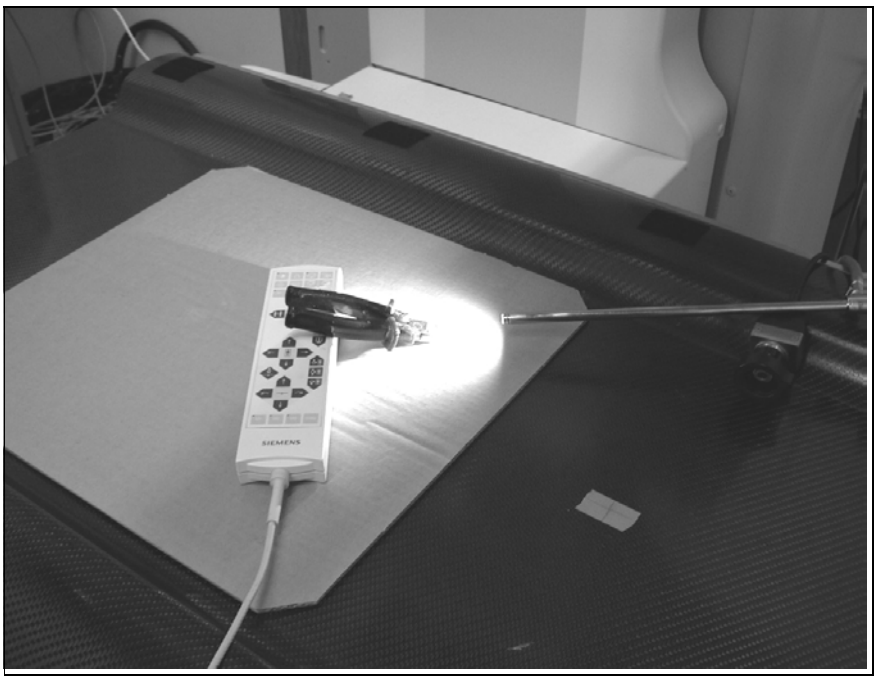

Fig. 2

Example of the test configuration with a chrome-plated Allen wrench

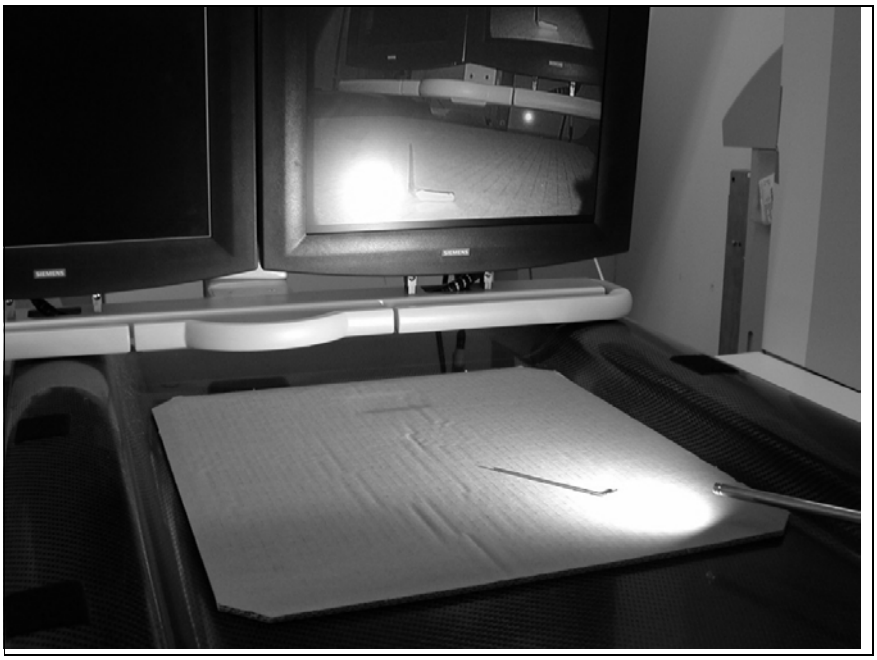

Fig. 3

Example of the test configuration with chrome-plated pliers, <u>contrast too low.</u>

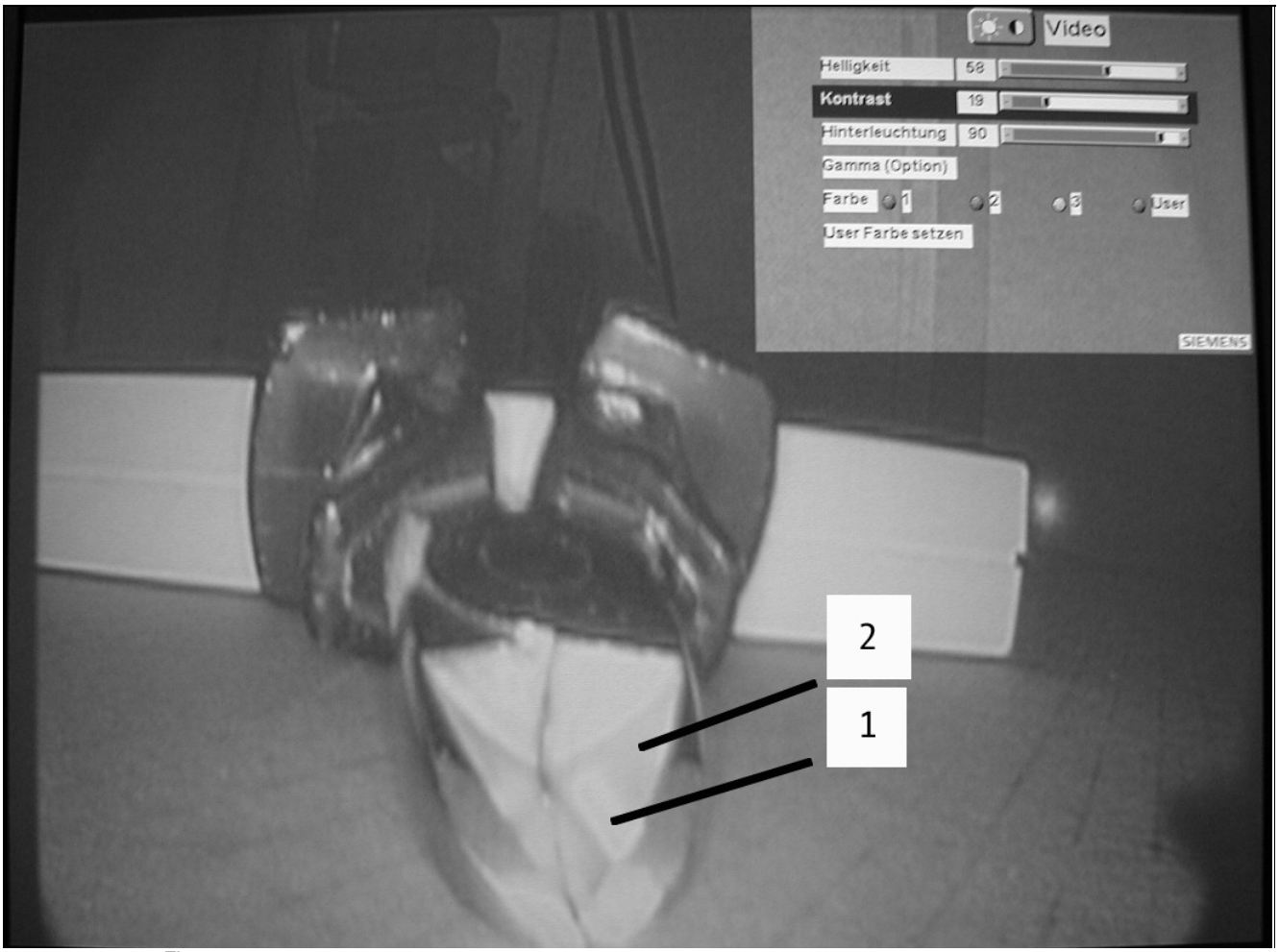

Fig. 4

Arrow 1:

The reflective areas of the pliers do not appear bright. The entire image seems to be covered in gray.

Arrow 2:

The structure of the pliers is visible.

Example of the test configuration with chrome-plated pliers, <u>contrast OK.</u>

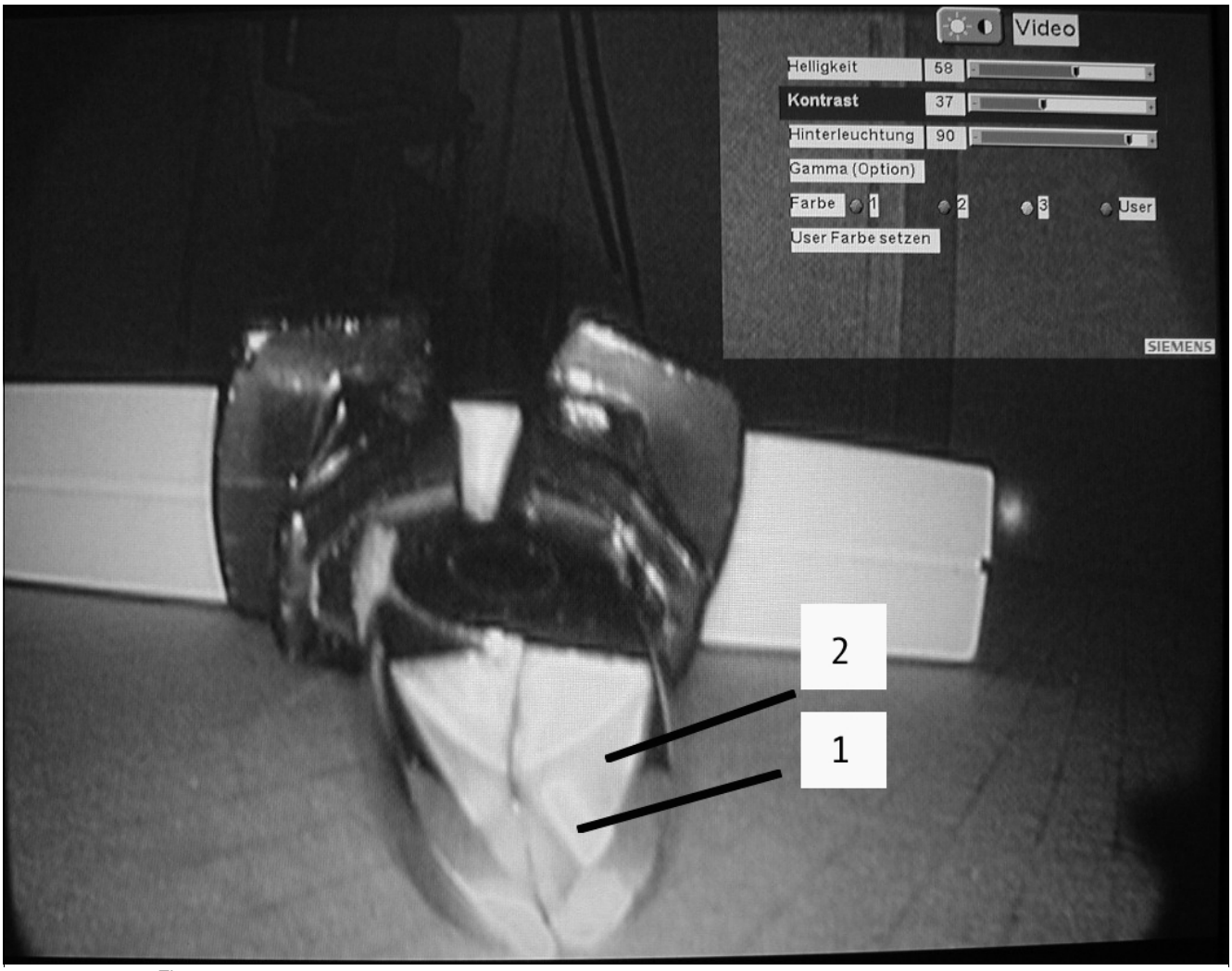

Fig. 5

Arrow 1:

The reflective areas of the pliers appear almost too bright and glaring and have a noticeable white border, which indicates the beginning of camera overmodulation. The reflective areas still indicate noise in the image.

Arrow 2:

When the monitor is set correctly, the structure of the pliers is visible without any saturation effects.

Example of the test configuration with chrome-plated pliers, <u>contrast too high.</u>

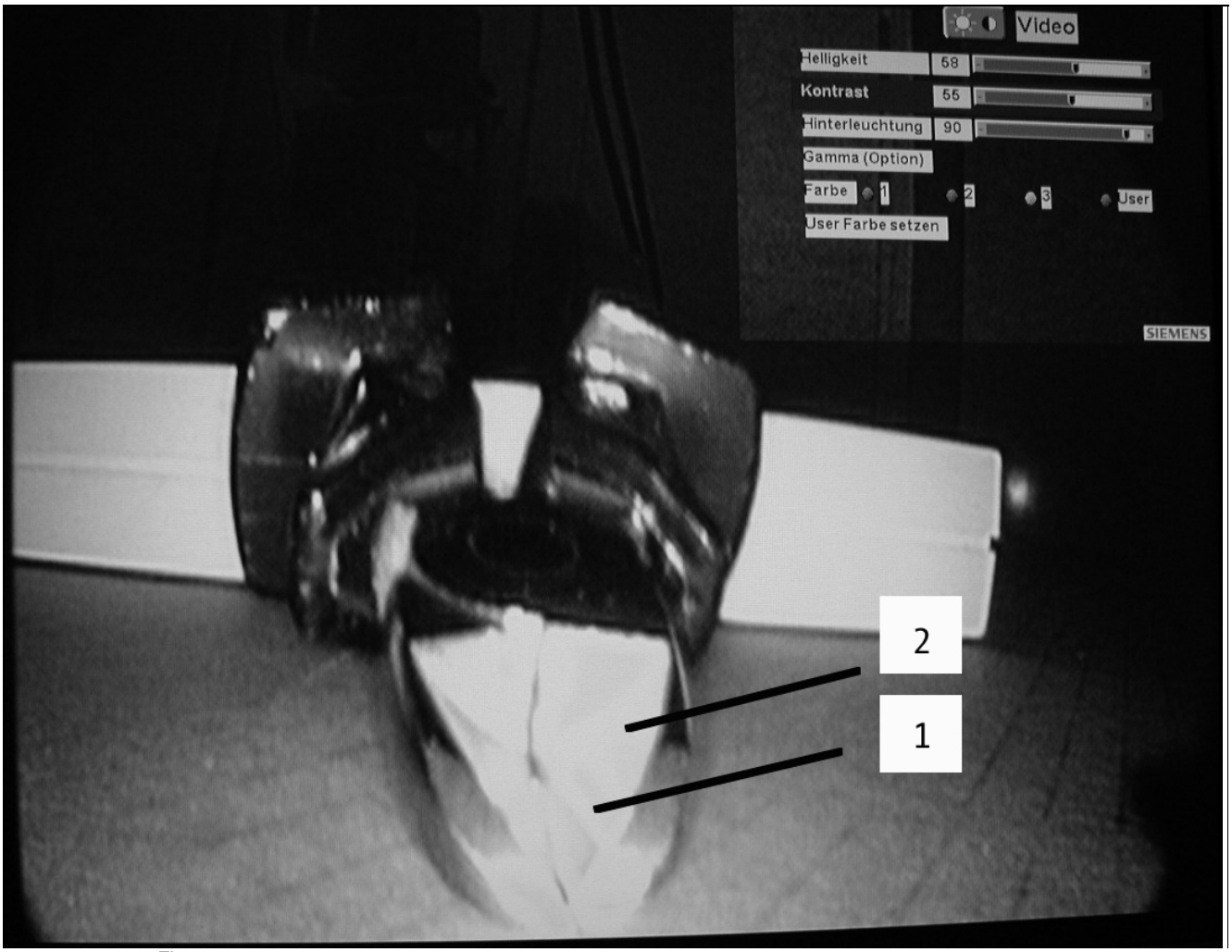

Fig. 6

Arrow 1:

When changing from the correct contrast setting to a high contrast setting, there is little change in the color of the reflective areas of the pliers.The reflective areas of the pliers appear bright and glaring, and do not have a white border. Image noise cannot be detected in the reflective areas.

Arrow 2:

The base structures disappear due to the saturation effect (overmodulation) at the analog monitor input. As a result, the contrast needs to be reduced.

Example of the test configuration with a chrome-plated Allen wrench, <u>contrast too low.</u>

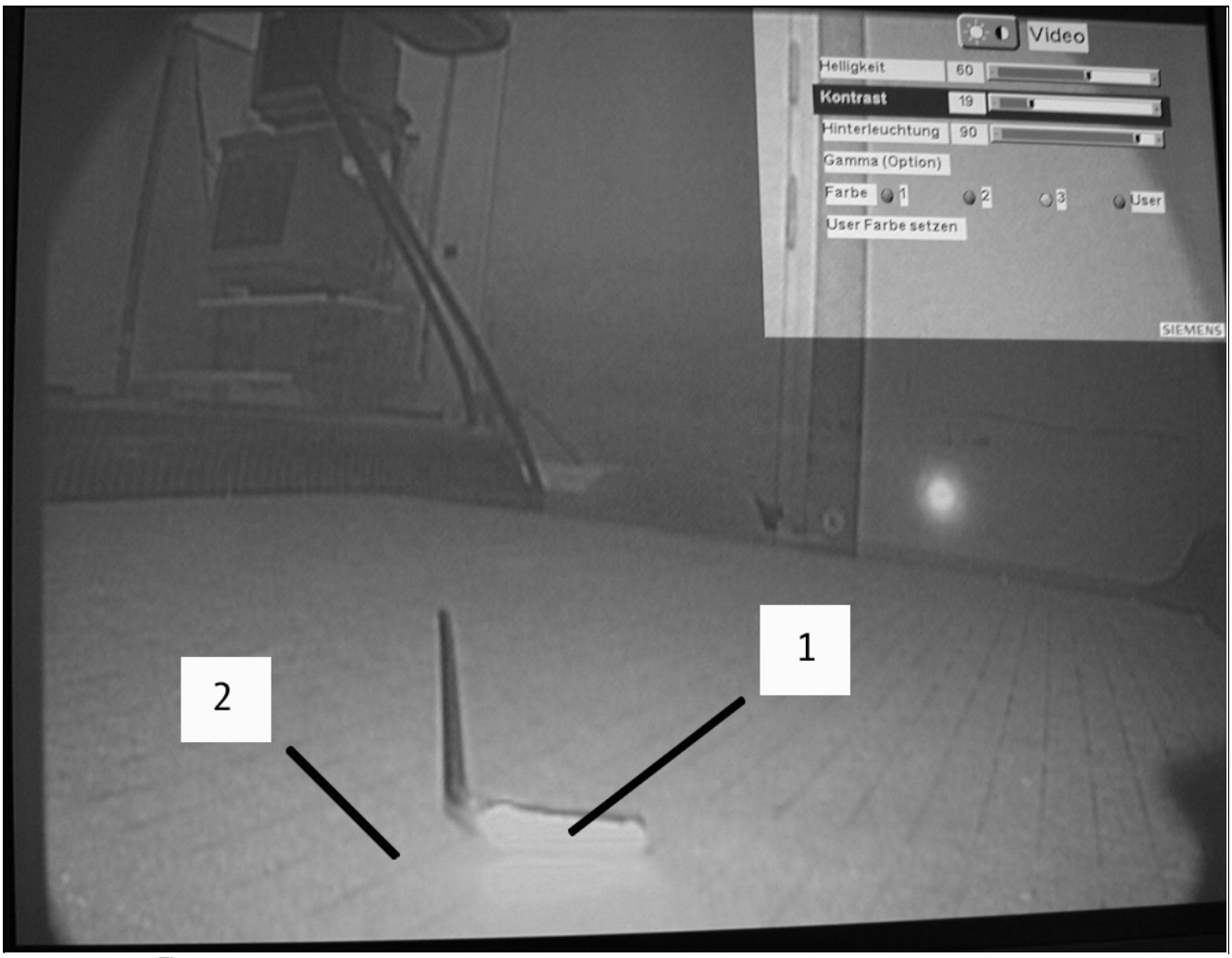

Fig. 7

Arrow 1:

The reflective areas of the Allen wrench do not appear bright. The entire image seems to be covered in gray.

Arrow2:

The base structure is visible.

Example of the test configuration with a chrome-plated Allen wrench, <u>contrast OK.</u>

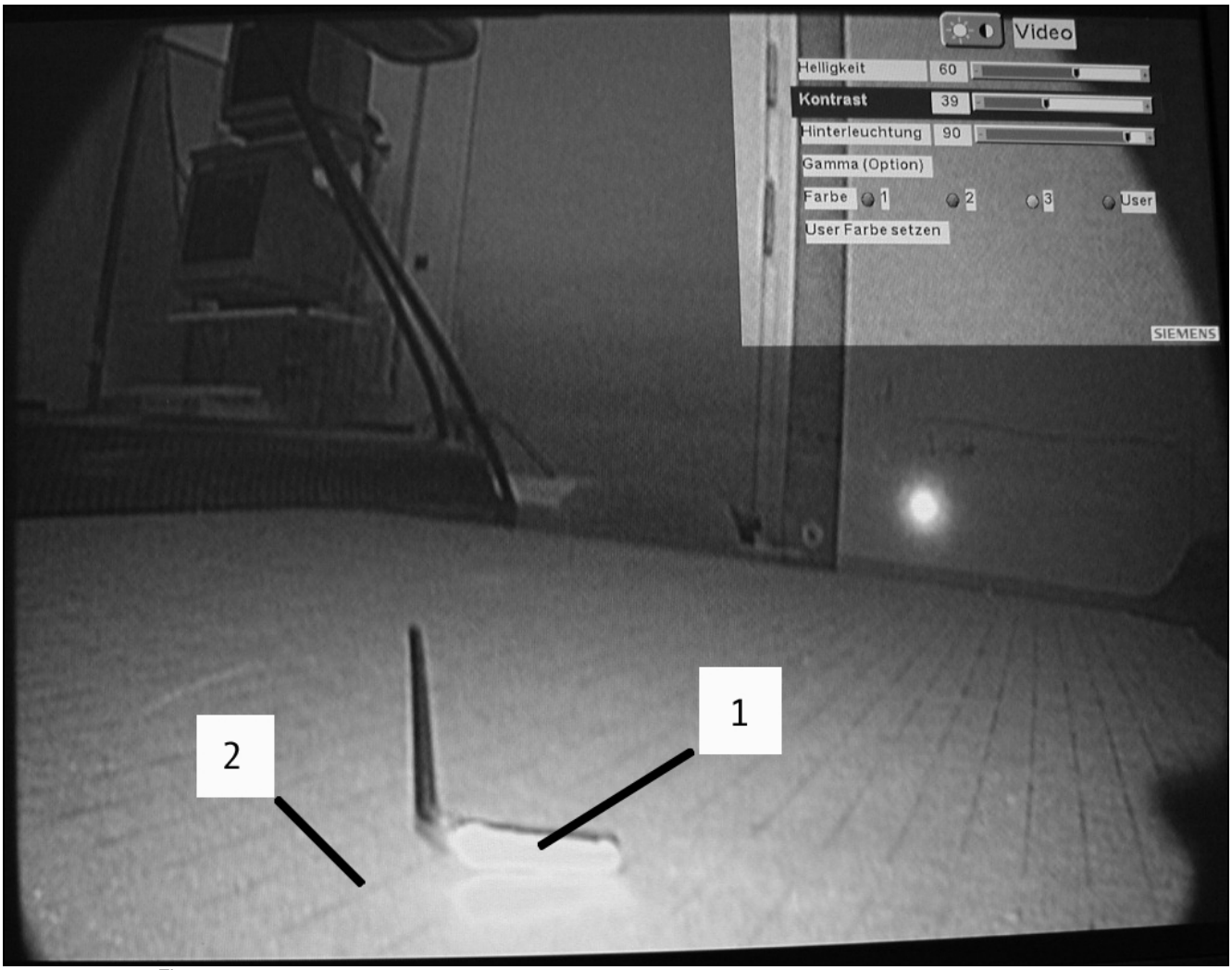

Fig. 8

Arrow 1:

The reflective areas of the Allen wrench appear almost bright and glaring and have a noticeable white border, indicating the beginning of camera overmodulation. The reflective areas still indicate noise in the image.

Arrow 2:

When the monitor is set correctly, the base structures are visible without saturation effects.

Example of the test configuration with a chrome-plated Allen wrench, <u>contrast too high.</u>

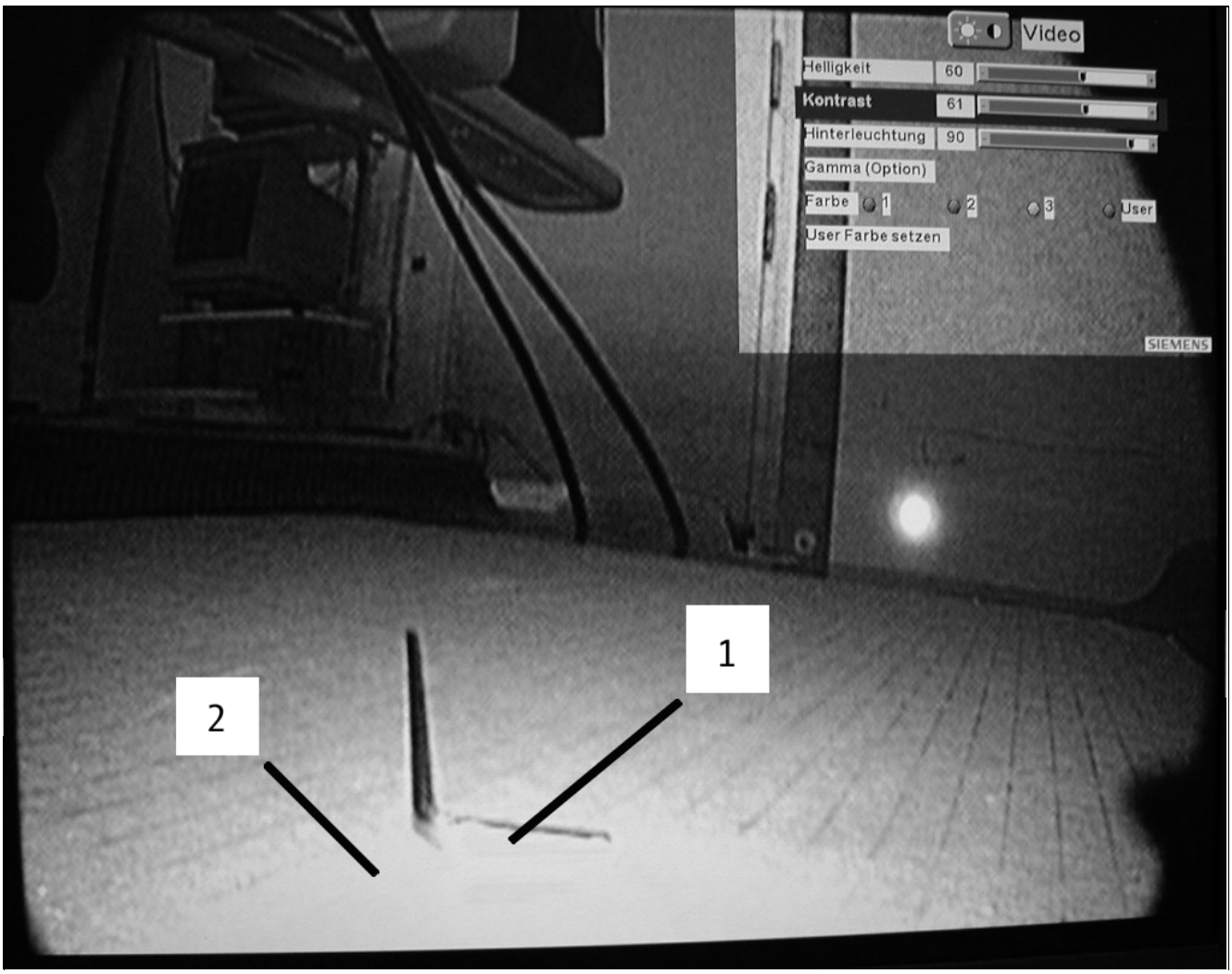

Fig. 9

Arrow 1:

When changing from the correct contrast setting to a high contrast setting, there is little change in the color of the reflective areas of the Allen wrench. The reflective areas of the Allen wrench appear bright and glaring, and do not have a white border. Image noise cannot be detected in the reflective areas.

Arrow 2:

The base structures disappear due to the saturation effect (overmodulation) at the analog monitor input. As a result, the contrast needs to be reduced.

Check the brightness. A gray layer should be visible on dark (black) areas.

This may be a dark area in the image, or may be shaded at the optic input.

Image Sector Size

The circular image section may shift because of obsolete camera connectors (snap lock) or connectors that have not been properly adjusted.

- Replace the old endoscope.

Incorrect image sizes may result when using endoscopes from different manufacturers.

- Use the endoscope provided by the camera manufacturer.

Changes to previous version 6 - 1

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